CLAIMS

1. An apparatus for electroless spray deposition of a metal layer on a substrate, comprising:

a processing chamber to hold at least one substrate on which the metal layer is to be deposited, the processing chamber including at least one section movable between an open position to allow the at least one substrate to be introduced into and removed from the processing chamber and a closed position to seal the processing chamber to allow for pressurization of the processing chamber;

an inlet to provide pressurizing gas to the processing chamber;

an exhaust line to exhaust pressurizing gas from the processing chamber;

a pressure regulator to regulate pressure within the processing chamber;

a sprayer provided within the processing chamber to spray an electroless plating solution onto the at least one substrate; and

a drain provided in the processing chamber to drain the electroless plating solution from the processing chamber.

2. The apparatus according to claim 1, wherein the processing chamber includes a chamber body and a stationary cover and wherein the chamber body is movable between the open position and the closed position.

3. The apparatus according to claim 2, wherein the chamber body has a cylindrical shape and, in the closed position, the chamber body is sealed to the stationary cover by an o-ring.

4. The apparatus according to claim 1, wherein the processing chamber includes a chamber body and a cover and wherein the cover is movable between the open position and the closed position.

5. The apparatus according to claim 4, wherein the chamber body has a cylindrical shape and, in the closed position, the cover is sealed to the chamber body by an o-ring.

6. The apparatus according to claim 1, wherein the sprayer is a spray bar.

7. The apparatus according to claim 1, further comprising a first reservoir to contain a metal stock solution comprising a solution of the metal to be deposited; a second reservoir to contain a reducing solution; the metal stock solution and reducing solution, when mixed in predetermined proportions forming the electroless plating solution; a mixing chamber for mixing the metal stock solution and the reducing solution to thereby provide the electroless plating solution; first and second lines, respectively connecting the first and second reservoirs to the mixing chamber, the first and second lines including respective first and second controllable valves to provide predetermined quantities of the solutions in the respective reservoirs to the mixing chamber at selected times; and a supply line connecting the mixing chamber and the sprayer so as to allow for delivery of said electroless plating solution to the sprayer.

8. The apparatus according to claim 7, further comprising a heater to heat solution in at least one of the first reservoir, the second reservoir, the mixing chamber, the first and second lines and the supply line.

9. The apparatus according to claim 1, wherein the pressure regulator includes a shutter provided in the exhaust line and a valve provided in the drain.

10. The apparatus according to claim 1, wherein the processing chamber includes a rotatable chuck on which the substrate is to be held.

11. The apparatus according to claim 10, further comprising a passage in the chuck for

allowing flow of a fluid to the back of the substrate to be held on the chuck.

12. The apparatus according to claim 10, further comprising an additional sprayer provided within the processing chamber adjacent an outer portion of the chuck to spray a fluid onto an edge of the at least one substrate.

13. The apparatus according to claim 7, further comprising at least one additional reservoir to contain at least one fluid selected from the group consisting of a pre-cleaning fluid, a pre-wetting fluid, ultra-pure water, deionized water, and a post-cleaning fluid.

14. An apparatus for electroless spray deposition of a metal layer on a substrate, comprising:

a processing chamber to hold at least one substrate on which the metal layer is to be deposited, the processing chamber including at least one section movable between an open position to allow the at least one substrate to be introduced into and removed from the processing chamber and a closed position to seal the processing chamber to allow for pressurization of the processing chamber;

means for pressurizing the processing chamber;

means for regulating pressure within the processing chamber; and

means for spraying an electroless plating solution onto the at least one substrate.

15. The apparatus according to claim 14, further comprising means for heating the electroless plating solution.

16. A method for electroless spray deposition of a metal layer on a substrate, comprising:

providing at least one substrate on which the metal layer is to be deposited in a processing chamber;

sealing the processing chamber in which the at least one substrate is provided;

pressurizing the processing chamber;

regulating pressure within the processing chamber; and

spraying an electroless plating solution onto the at least one substrate.

17. The method according to claim 16, further comprising heating the electroless plating solution.

18. The method according to claim 16, wherein the at least one substrate includes a layer containing copper provided thereon and the electroless plating solution includes cobalt.

19. The method according to claim 16, further comprising mixing a metal stock solution and a reducing solution to provide the electroless plating solution in a mixing chamber connected by a supply line to a sprayer in the processing chamber.

20. The method according to claim 16, further comprising flowing a fluid onto a back surface of the at least one substrate to prevent exposure of the back surface of the at least one substrate to the electroless plating solution.

21. The method according to claim 20, wherein the fluid is selected from the group consisting of inert gas and water.

22. The method according to claim 21, further comprising heating the fluid to control a temperature of the at least one substrate.

23. The method according to claim 20, further comprising heating the fluid to control a temperature of the at least one substrate.

24. The method according to claim 16, further comprising pre-cleaning and/or pre-wetting the at least one substrate in the processing chamber before spraying the electroless plating

solution onto the at least one substrate.

25. The method according to claim 16, further comprising pre-cleaning and/or pre-wetting the at least one substrate in the processing chamber before pressurizing the processing chamber.

26. The method according to claim 16, further comprising post-cleaning the at least one substrate in the processing chamber after spraying the electroless plating solution onto the at least one substrate.

27. The method according to claim 16, further comprising annealing the at least one substrate in the processing chamber after spraying the electroless plating solution onto the at least one substrate.